

CLAIMS

1. A method of identifying conflicts in a set of system operating rules, comprising the steps of:-
 - 5 a) storing rule data representing a set of one or more system operating rules, each rule comprising at least one system command;
 - b) receiving semantic data representing a graph structure of hierarchical semantic relationships between available system commands, including those in the set of system operating rules;
 - 10 c) expanding the system operating rules according to the allowable hierarchical semantic relationships between the available system command portions, to give, for any particular system operating rule, an additional system operating rule for each hierarchical semantic level in the graph structure below the system command present in the particular rule; and
 - 15 d) comparing the expanded system rules to identify those rules for which a semantic conflict occurs therebetween.
2. A method according to claim 1, wherein each stored rule comprises a subject portion identifying one or more system users, a system command portion identifying the
20 system command to which the rule relates, and an object portion identifying one or more system objects to which the rule applies; and wherein when any of the system rules identify more than one system users in the subject portion, and/or more than one system objects in the object portion, the method further comprises expanding such rules to produce replacement rules having a single system user in the subject portion, and a
25 single system object in the object portion, said replacement rules being produced before the expansion step c) is performed.
3. A method according to any of the preceding claims, wherein each stored rule further comprises a positive indication portion, which indicates whether the rule is to be
30 applied positively or negatively, the method further comprising the step of producing from the semantic data a second graph structure corresponding to the inverse of the hierarchical semantic relationships between the available system commands, and wherein the expanding step c) uses the hierarchical semantic relationships of the second graph structure to expand any rules for which the positive indication portion thereof
35 indicates are to be applied negatively.

4. A method of generating a set of system operating rules from an initial set of system operating rules, comprising the steps of:
identifying conflicts in the initial set of system operating rules using the method of any of claims 1 to 3; and
5 resolving any identified conflicts in the expanded set of initial rules to give a resolved expanded set of system operating rules.
5. A method according to claim 4, and further comprising the step of:
reducing the resolved expanded set of initial rules to canonical form to give an
10 optimised set of system operating rules.
6. A method of operating a system comprising applying the set of system operating rules generated by either claim 4 or 5 in the system operation.
- 15 7. A computer program or suite of programs arranged such that when executed by a computer it causes the computer to perform the method of any of claims 1 to 6.
8. A computer readable storage medium storing a computer program or suite of programs according to claim 7.
- 20 9. A system for identifying conflicts in a set of system operating rules, comprising:-
a) storage means for storing rule data representing a set of one or more system operating rules, each rule comprising at least one system command;
b) data receiving means for receiving semantic data representing a graph
25 structure of hierarchical semantic relationships between available system commands, including those in the set of system operating rules; and
c) processing means operable to:
expand the system operating rules according to the allowable hierarchical semantic relationships between the available system command portions, to give, for any
30 particular system operating rule, an additional system operating rule for each hierarchical semantic level in the graph structure below the system command present in the particular rule; and
compare the expanded system rules to identify those rules for which a semantic conflict occurs therebetween.

10. A system according to claim 9, wherein each stored rule comprises a subject portion identifying one or more system users, a system command portion identifying the system command to which the rule relates, and an object portion identifying one or more system objects to which the rule applies; and wherein when any of the system rules
5 identify more than one system users in the subject portion, and/or more than one system objects in the object portion, the processing means is further arranged to expand such rules to produce replacement rules having a single system user in the subject portion, and a single system object in the object portion.
- 10 11. A system according to any of claims 9 to 10, wherein each stored rule further comprises a positive indication portion, which indicates whether the rule is to be applied positively or negatively; and wherein the processing means is further operable to:
15 produce from the semantic data a second graph structure corresponding to the inverse of the hierarchical semantic relationships between the available system commands; and to use the hierarchical semantic relationships of the second graph structure to expand any rules for which the positive indication portion thereof indicates are to be applied negatively.
12. A system for generating an optimised set of system operating rules from an initial
20 set of system operating rules, comprising:
the system of any of claims 9 to 11; and further comprising processing means arranged to:
resolve any identified conflicts in the expanded set of initial rules to give a resolved expanded set of system operating rules.
- 25 13. A system according to claim 12, wherein the processing means is further arranged to:
reduce the resolved expanded set of initial rules to canonical form to give an optimised set of system operating rules.
- 30 14. A system arranged to operate in accordance with a set of system operating rules generated by either of the systems of claims 12 or 13.